Donald B. Wagner, *The Traditional Chinese Iron Industry and its Modern Fate.* Nordic Institute of Asian Studies Report series, No. 32. Richmond, Surrey: Curzon Press, 1997. xii, 106 pp.

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This solid little book, a revised and considerably expanded version of an article originally published in this journal (Vol. 12 (1995), pp. 138-61), is a tour-de-force. In a mere 79 pages of text, the author describes in some detail the Chinese iron industry of late imperial times while also providing a nuanced discussion of the changes the industry underwent in the nineteenth and twentieth centuries in response to foreign competition, war and revolution, and the resulting changes in the Chinese economy. His main concern is to show "the ways in which technological choices interact with other historical factors" (p. 1).

As in his volume on the Dabieshan iron industry[1] and in the monumental *Iron and Steel in Ancient China*,[2] Wagner insists on a thorough understanding of the techniques of iron production as the necessary prelude to comprehending the iron industry in its larger context. Even with his finely-honed ability to describe technological matters with considerable clarity, there are points at which the complexities of the technology might easily overwhelm the story. Here, Wagner wisely relegates the details to boxes separate from the main text, a feast for those keenly interested in the technology itself but easily skimmed by those whose main interests lie elsewhere. (On the other hand, there are times when most readers could have used a bit more technological explanation, as when we are told that the "roundabout" "indirect process" is the most efficient way to produce wrought iron (p. 13) but are left to wonder just why that is so.)

In a concise analysis that nevertheless displays considerable breadth and depth, the author focuses on four regional components of the traditional iron industry in China, each with its distinctive structures and techniques responding to its raw material endowment, its labor force, and its market possibilities: (1) the Dabieshan mountains at the intersection of the borders of Henan, Hubei and Anhui, where a small-scale iron industry was crucial to an economy marked by severe poverty; (2) Sichuan with its large-scale ironworks and the largest blast

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[1] Donald B. Wagner, *Dabieshan: Traditional Chinese Iron-production Techniques Practiced in Southern Henan in the Twentieth Century* (London & Malmö: Curzon Press, 1985). The discussion in the present volume is able to benefit from sources not available to him when writing that work (p. 15).

[2] Leiden: E. J. Brill, 1993.

furnaces in China, all made possible by a large but isolated market; (3) Shanxi, whose considerable production for the north China market relied on the use of a distinctive crucible smelting process by large numbers of small producers; and (4) Guangdong, where one sees a unique dual-sector industry with large-scale and small-scale ironworks. After three introductory chapters that describe his aims for this book, discuss the changing "economic geography" of traditional iron production during the 19th and 20th centuries (right up to the Great Leap Forward), and provide a brief overview of traditional iron production techniques, Wagner devotes a separate chapter to each of his regions. In these chapters, he first discusses in some detail the technology of iron production in that region and then moves on to relate the technology to the structure of the industry in the context of the economic and geographical conditions in which it found itself. A short concluding chapter neatly summarizes the main points of the story.

Wagner attributes the general decline of the Chinese iron industry during the 19th and early 20th centuries above all to competition from cheap imported iron. What makes this book so useful, however, is his explanation of how and why this happened in different contexts (and, indeed, largely did not happen in Dabieshan). Guangdong, for example, found its large, highly-capitalized ironworks particularly vulnerable, as was true also in other parts of China. Wagner argues persuasively that this rather counter-intuitive phenomenon can be explained in large measure by the fact that big ironworks had to have access to an extensive market that, in turn, was impossible without good transportation facilities. Those very same transportation advantages, however, typically made possible the penetration of the market by low-priced foreign imports, with which the Chinese could not compete.

This book, despite its size, does not shy away from some very big questions. For example, Wagner argues that technological "progress" need not be defined exclusively by the implemention of innovations. Looking at the question "in another, more detached, sense" (?), he suggests viewing as "progress" the abandonment of theoretically best practices when economic circumstances may call for reversion to earlier, less "sophisticated" methods if these changes "make for a more efficient iron industry in the specific context in which it must function" (p. 46). An interesting point, if not beyond question. One wonders exactly what is meant by "efficiency," and what is the link between efficiency and quality. The pressure of foreign competition, as the book notes, brought a decline in the quality of iron produced in places like Shansi which were forced to make technological changes, usually leading to lower quality, in a struggle to reduce their costs.

One can also appreciate, while reserving assent to, some of Wagner's more speculative suggestions. We learn, for example, that the small-scale technologies of Dabieshan and Guangdong, well-adapted to the conditions in which they found themselves *and* largely impervious to foreign competition, seem to have undergone little change in the 19th and 20th centuries. Wagner suggests that, with the loss of imported iron in World War I which sent iron prices in China soaring, the large-scale industries based on production techniques of an earlier period

might have made a comeback but were unable to do so because the earlier technology had been forgotten. This is an interesting and plausible speculation, but it relies only on the Guangdong case. We will need more evidence before we can assess whether it can serve to describe what happened in iron production centers such as Yunnan and Hunan (p. 30), which are not treated in this book.

Special thanks should also go to the publisher of this volume. Ample in-line Chinese characters, notes at the bottom of the page; 29 illustrations; and a very nice map including all modern place names mentioned, make the book a pleasure to read, even in a rather small font. Would that the publishers had chosen a less glossy paper, thereby sparing the reader that annoying glare in all but the most ideal lighting conditions.